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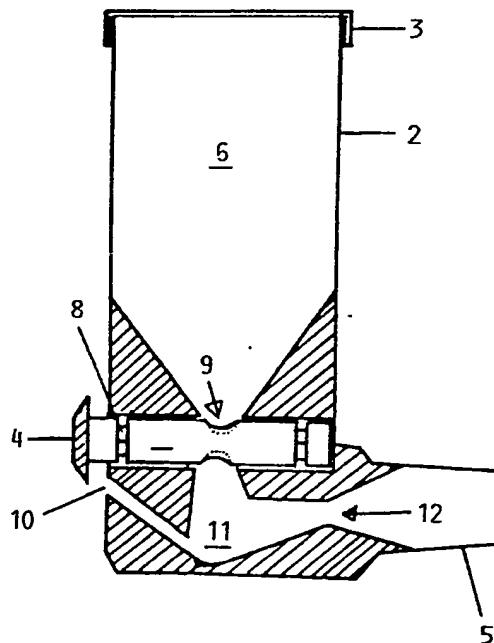
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GB A 2102295 EP A1 0079478
GB A 2041763 US 2587215
GB 1603186

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(54) Dosing device

(57) The invention relates to a device for dosing a medicinal substance for inhaling. The device comprises a storage chamber (6) for the medicinal substance, dosing means (7,9), and a nozzle (5). The body of the dosing means (7) has depressions (9) for measuring the dose of the medicinal substance, the medicinal substance being released from these depressions into the air conduit (10,11,12,5) for inhalation into the lungs with the aid of active inhalation. The device is provided with an indexing mechanism e.g. of the ballpoint pen type.



A - A

FIG. 2

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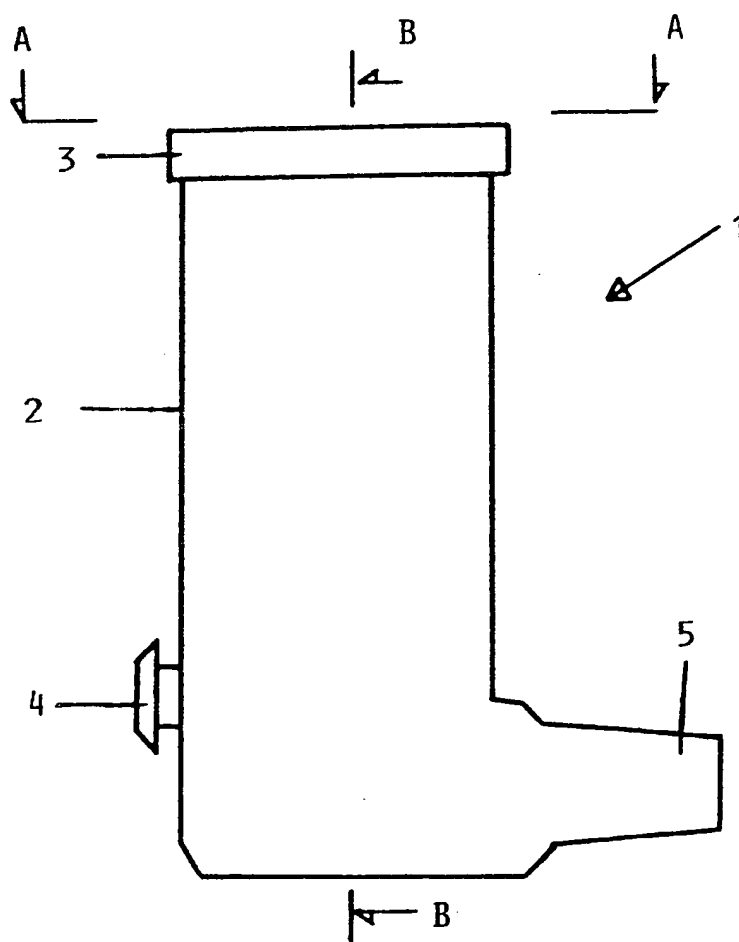
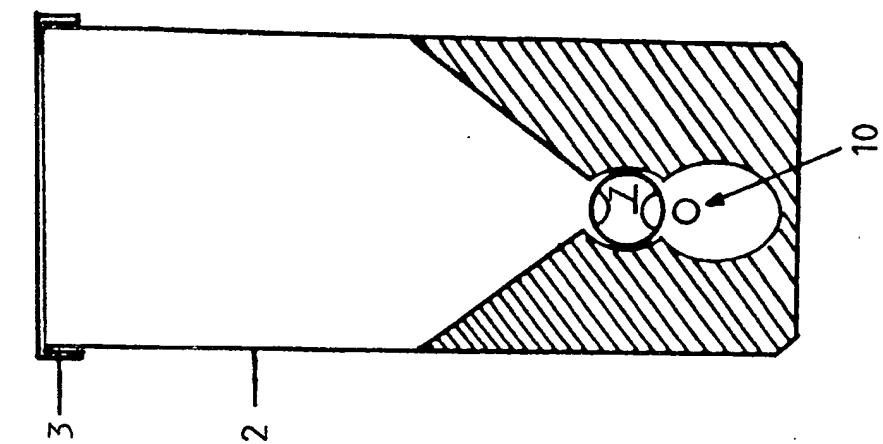
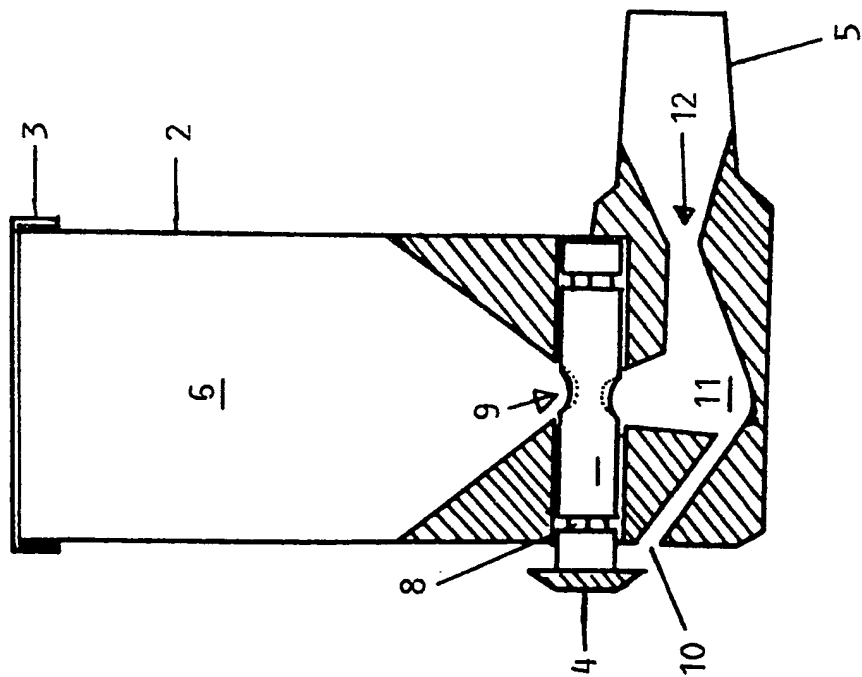


FIG. 1



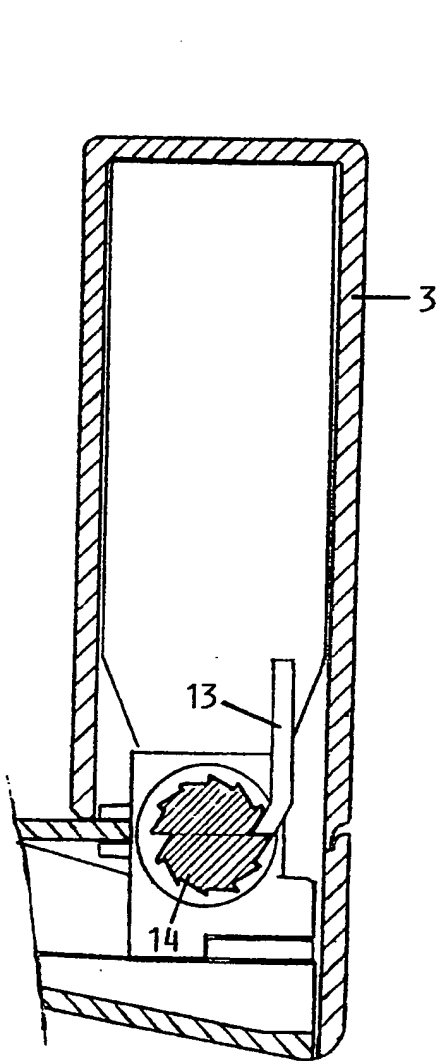
B - B

FIG. 3



A - A

FIG. 2



C - C

FIG. 5

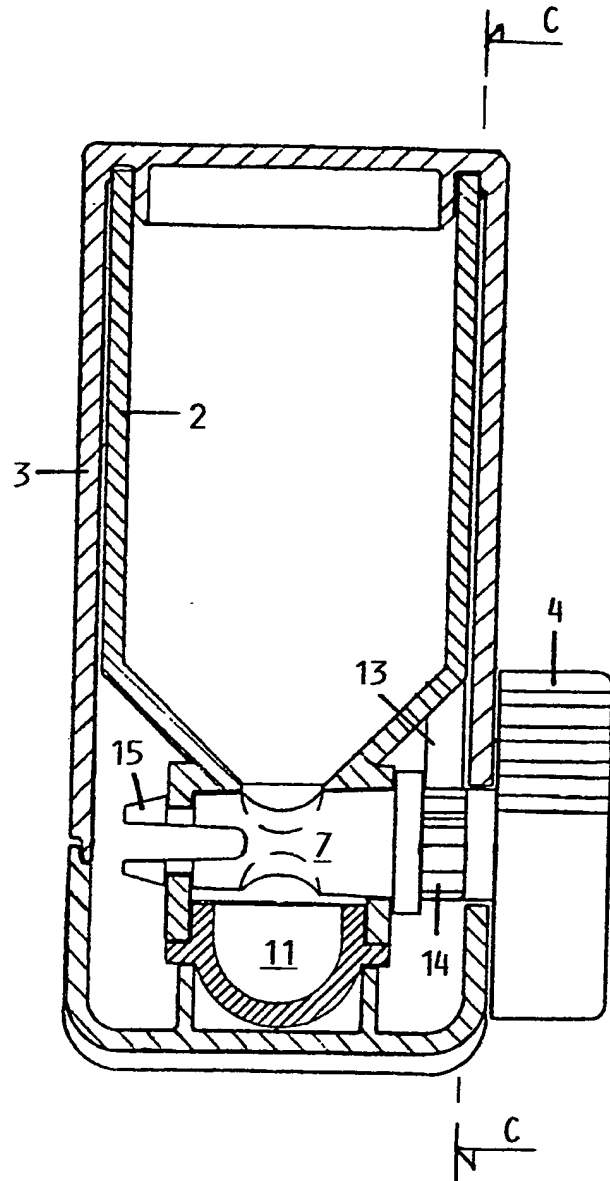


FIG. 4

SPECIFICATION

Dosing device

- 5 The present invention relates to a dosing device and in particular to a dosing device for administering by inhalation a pulverous medicinal substance. Devices of this type are used, for example, in the treatment of asthma.
- 10 The most commonly used device for introducing a medicinal substance into the bronchi makes use of a propellant gas in order to form an aerosol. A problem found with such a device is that the inhalation of the user may be mistimed relative to the
- 15 moment of spraying.
- Another type of device, of which the present invention is an example, is one based on active inhalation. These are medically superior to the aerosol type previously mentioned. In devices of
- 20 this kind, the user cannot mistime his or her inhalation. In one known device of this kind, a capsule is placed in the inhaler, the capsule being broken before inhalation, whereby the medicinal substance contained in it is caused to pass into the
- 25 lungs together with the inhaled air. A disadvantage of such a device is that it is complicated to use. The capsule which contains the dose of medication must be installed in the device prior to each use. This procedure takes time and a person having a severe asthma attack may fail to achieve it. A
- 30 further disadvantage of this kind of device is that occasionally fragments of the capsule pass into the respiratory passages.
- A further kind of device which is based on active
- 35 inhalation is disclosed in GB 2,041,763. This device includes a chamber for storing a large amount of the medicinal substance. The device also includes dosing means for releasing a suitable dose of the medicinal substance during each inhalation, and
- 40 also a nozzle through which air and the medicinal substance present in the air are inhaled into the lungs.
- The device disclosed in GB 2,041,763 does however possess several disadvantages. Firstly the device is designed to release the dose of the
- 45 medicinal substance by rotating the storage chamber of the device while the device is positioned with the nozzle upwards. However, during inhalation of the medicinal substance, the device must
- 50 be turned to a horizontal orientation. Thus the release of the dose when the device has a vertical orientation may confuse the user.
- Secondly, in order to obtain the correct and precise dose, the device must be precisely vertical
- 55 when the dose is released.
- Thirdly, the device requires the user to inhale rather strongly to ensure that the medicinal substance is carried along with the air all the way into the lungs.
- 60 A further drawback with this device is that the dose of the medicinal substance is released from the dosing means into an air conduit section which is aside from the actual air flow. This sometimes results in the user receiving either an incomplete
- 65 dose or an overdose because either the air flow

fails to carry all the medicinal substance with it, or carries some medical substance remaining from a previous use, thereby producing an overdose.

- 70 The present invention aims to provide a dosing device which is easy to use under all circumstances, and in which inhalation can take place with the device in the same orientation as that in which the medicinal substance is directed from the storage chamber into the dosing cavity.

- 75 The present invention also aims to provide a simple device which is reliable in operation, which can be manufactured at moderate cost, but which, nevertheless, is not a disposable device.

- 80 According to the present invention there is provided a device for administering a pulverous medicinal substance by inhalation comprising:

a storage chamber for storing the medicinal substance,

- 85 a dosing means comprising a body rotatable about its axis within a housing, the body and housing defining at least one space arranged to be filled with the medicinal substance in a first position of the body and to dispense a predetermined amount of it in a second position of the body.

- 90 an air conduit into which said predetermined amount is dispensed, and

a nozzle for allowing air drawn through the air conduit to be inhaled.

In the drawings:

- 95 *Figure 1* is a schematic illustration of a device according to one embodiment of the invention,

Figure 2 is a cross-sectional view of the device of *Figure 1* along section A-A,

- 100 *Figure 3* is a cross-sectional view of the device of *Figure 1* along section B-B,

Figure 4 is a cross-sectional view of a second embodiment of a device in accordance with the invention of the kind illustrated in *Figure 2* and

- 105 *Figure 5* is a cross-sectional view of the device of *Figure 4* along section C-C.

Referring now to the drawings and in particular to *Figures 1-3*, a device according to one embodiment of the present invention is indicated generally at 1, and comprises a substantially cylindrical structure provided with two protrusions. The cylindrical portion 2 of the structure is hollow and encloses a chamber 6 for storing the medicinal substance. The storage chamber is covered at the top by a cover 3 which is fitted by means of a thread or by press fitting. A switch 4 for operating the dosing device protrudes from the cylinder surface, and a nozzle 5 extends away from the axially opposing surface of the cylinder.

- The method by which the device operates can be
- 120 seen from *Figures 2* and *3*. The medicinal substance is initially dispensed into the storage chamber 6, for example in a quantity which will suffice for one hundred or two hundred individual doses. The lower portion of the storage chamber is conical, which helps to direct the flow of the medicinal substance to the correct place in the dosing means.

- The dosing means comprises, for example, a cylindrical body 7 which is rotatable about its longitudinal axis within a housing, the body and
- 130

housing defining at least one space arranged to be filled with the medicinal substance in a first position of the body. Preferably the body has one or more depressions 9 formed in it (e.g. several) for measuring the dose to be administered. The rotation of the body 7 and the consequent dosing is controlled by operating means 4. The operating means 4 may be actuated by either manually rotating it, with e.g. fingers, which consequently rotates the body 7, or by the user pressing it towards the central axis of the cylindrical structure. An operating mechanism 8 is further provided as part of the dosing means. This may comprise, for example, the type of mechanism conventionally used in retractable ballpoint pens. In addition to this kind of mechanism being simple and reliable in operation, it has the further advantage that it taps the body 7, whereby the medicinal substance is substantially all shaken from the depression 9. If the operating means 4 is rotatably operated, the operating mechanism 8 is arranged to stop the rotational movement of the body when one of the depressions 9 faces the cavity 11 and one faces the storage chamber 6 in the case of a body having two depressions, thereby at the same time tapping the body.

Upon detachment from the dosing means, the medicinal substance is deposited in to cavity 11. A conduit 10 leading into the cavity 11 is provided which allows air to flow the cavity 11, and then in turn to be inhaled via the nozzle 5. The medicinal substance is carried from the cavity 11 and through the nozzle by the air flow. There may be one or several inflow conduits 10. In the air conduit leading from the cavity 11 to the nozzle 5 there is provided, prior to the actual nozzle, a throttling section 12, which causes the final mixing of the medicinal substance with the flowing air. From the nozzle 5 the medicinal substance is carried along with the air into the lungs. The turbulent air flow produced aids the travel of the medicinal substance into the lungs, since such an air flow causes the medicinal substance to be evenly distributed.

Turning now to Figures 4 and 5, these show another embodiment of the device in accordance with the invention. In this embodiment the cover of the device is extended so that the storage chamber 2 for the medicinal substance is completely surrounded by the cover 3. In this embodiment the correct dose of the medicinal substance is freed from the depression 9 by manually turning the knob 4 through 180°.

In order to ensure that all the medicine is freed from the depression 9, a toothed section 14 is provided as part of the cylindrical body 7. A strip 13 made of plastics or of metal is biased into contact with the toothed section. When the knob 4 is rotated, the end portion of the strip 13 moves from one tooth to another causing the body to vibrate which in turn shakes free substantially all of the medicinal substance from the depression. There are two deeper teeth around the circumference of the toothed section which allows the user to sense that the knob 4 has been sufficiently rotated.

As can be seen from Figure 4, the device comprises several separate components which can be easily assembled. The cylindrical body 7 is secured in place by the spring action of the end portion 15 of the body, illustrated in Figure 4.

The two embodiments illustrated in the drawings are only examples of numerous other possibilities. Clearly the external appearance of the device is secondary, but since the illustrated design is similar to that of aerosol dosing devices, the shape is familiar to those who may have previously used an aerosol device. This, of course, facilitates the use of the device.

The nozzle of the device may be replaceable instead of the fixed one illustrated, and it can be of any desired shape. The dosing means 4, 7, 8, 9 can, in addition to the orientation presented, also be placed in some other manner, for example transversally to that illustrated. The essential point is that the operating means is convenient for the user in that the knob 4 can be turned or pressed with ease. In the body 7 of the dosing means there may be one, two or even several depressions 9 which determine the dosage. It is also possible to make the body 7 with its depressions replaceable, in which case the same device can be used for dosing different medicinal substances. In such a case only the body 7 having depressions 9 suitable for the dosage of the medicinal substance used will be placed in the device.

It should further be noted that the body 7 need not be cylindrical in shape, although this is preferred due to its ease of manufacture. Thus, for example, a partially spherical or a spherical dosing means is possible. In this case the sphere is arranged to rotate about a certain axis, and the depressions receiving the dose of the medicinal substance formed on its circumference. It will be appreciated that there could be two sets of depressions for two differing medicinal substances, by way of two rows located on different axes around the circumference.

Thus, by altering the position of the axis of rotation of the sphere, suitable dose depressions would be automatically obtained for two different medicinal substances.

Depending on the medicinal substances, it is sometimes necessary to provide drying in the storage chamber 6 for the medicinal substances so that the substances will not form lumps and thereby cause the device to malfunction. It is easy to append a drying chamber to the present device, for example so that the chamber is located on the lower surface of the cover 3. If so desired, the cover can further be provided with a seal made of rubber or some other suitable material, whereby penetration of moisture into the chamber 6 from outside is substantially prevented.

125 CLAIMS

1. A device for administering a pulverous medicinal substance by inhalation, comprising:
a storage chamber for storing the medicinal substance,

- a dosing means comprising a body rotatable about its axis within a housing, the body and housing defining at least one space arranged to be filled with the medicinal substance in a first position of the body and to dispense a predetermined amount of it in a second position of the body, an air conduit into which said predetermined amount is dispensed, and a nozzle for allowing air drawn through the air conduit to be inhaled.
2. A device according to Claim 1, wherein the body is cylindrical, partially spherical, or spherical.
3. A device according to any preceding claim wherein the at least one space is formed by a depression formed in the body.
4. A device according to any preceding claim, further comprising an operating means for rotating the dosing means about its axis to receive and dispense the medicinal substance.
5. A device according to Claim 4, wherein the operating means is manually rotatable and includes a tapping mechanism.
6. A device according to Claim 4 or Claim 5, wherein the operating means comprises a "snap device" of the type used in retractable ballpoint pens.
7. A device according to any preceding claim, wherein the body is cylindrical and has two depressions on its circumference.
8. A device according to any preceding claim, wherein the lower portion of the storage chamber is conical towards the dosing means.
9. A device according to any preceding claim, wherein the air conduit comprises a conduit for inflowing air, a cavity into which the medicinal substance is dispensed from the dosing means, and a nozzle.
10. A device according to Claim 8, wherein the air conduit further comprises a throttling section for enhancing the mixing of the air and the medicinal substance creating turbulence in the air stream.
11. A device substantially as described herein with reference to any of the drawings.
12. A device for the inhaling of a pulverous medicinal substance by a method based on active inhalation, comprising a storage chamber (6), dosing means (7, 9) and a nozzle (5), characterized in that the dosing means comprises a body (7) rotatable about its axis, the body having a depression (9) or depressions (9) for receiving medicinal substance in one position and for dispensing it in another position into the air conduit (10, 11, 12, 5) for inhaling.